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And Scientific Research
University of Baghdad
College of Dentistry
Periodontics department

Association of cyclooxygenase-2 (COX-2) gene -1195A/G (rs689466) single nucleotide polymorphism with chronic periodontitis in a sample of Iraqi population.

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BY

Suha Aswad Dahash

B.D.S

Supervised by

Prof. Dr. Maha Shukri Mahmood

B.D.S, M.Sc. Periodontics

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Abstract

Background: Chronic periodontitis (CP) is a complex inflammatory disease affecting tooth supporting structures causing irreversible destruction. It is initiated by microbial dental plaque and modified by genetic and environmental factors. Individuals differ in their susceptibility to periodontitis, and this has been attributed to differences in inflammatory-immune responses. Genetic variations among individuals account for a part of this difference as they play an important role in determining the nature of the host response. Genetic polymorphisms of molecules involved in periodontitis pathogenesis have been associated with increased disease risk. Cyclooxygenase-2 (COX-2) enzyme is an important mediator in periodontitis pathogenesis, it converts arachidonic acid to prostaglandins, mainly prostaglandin E2 (PGE2) the key inflammatory mediator that stimulates bone resorption and periodontal destruction. Polymorphisms of COX-2 gene could be associated with increased prostaglandin production and periodontitis susceptibility. COX2 -1195A/G single nucleotide polymorphism (SNP) is one of the polymorphisms in the promotor area of COX-2 gene that have been reported to be associated with chronic periodontitis susceptibility in certain populations.

Aims of the study: This study aimed to investigate:

1- The association of COX2 -1195 SNP with chronic periodontitis in a sample of Iraqi population.
2- The association of this polymorphism with increased disease severity, and
3- Whether there is difference in the distribution of the SNP alleles between males and females.

Materials and methods: One hundred Iraqi subjects were enrolled in this case-control study. The case group composed of 70 chronic periodontitis patients (35 males and 35 females) with age range of 30-55 years, and the control group

composed of 30 periodontitis free subjects (15 males and 15 females) with age range of 30-50 years. The chronic periodontitis group was classified according to the severity of clinical attachment loss into 2 subgroups: moderate and severe chronic periodontitis subgroups. Clinical periodontal parameters including: plaque index, gingival index, bleeding on probing, probing pocket depth and clinical attachment level were recorded for the participants. 3ml of the venous blood was collected from each subject. DNA was extracted from blood samples for genotyping. Genotyping of COX-2 single nucleotide polymorphism at the position -1195 was performed using polymerase chain reaction-restriction fragment length polymorphism (PCR-RFLP) method and agarose gel electrophoresis.

Results: AA genotype was the most prevalent followed by AG and GG genotypes. Genotype and allele frequencies of COX2 -1195 SNP in the control group were in Hardy Weinberg equilibrium. The comparison between moderate chronic periodontitis subgroup and controls revealed a non-significant difference in allele frequency (P=0.983) and an equal G allele carriage in both groups (P=1, OR=1), while the comparison between severe chronic periodontitis subgroup and controls revealed a significantly higher frequency of allele G carriers in the severe cases compared to controls (P=0.0097) with 2.36 times higher risk for severe periodontitis in allele G carriers compared to non-carriers. A comparison between males and females showed a non-significant difference in allele frequency (p=0.887).

Conclusion: Allele G of the COX2 -1195 single nucleotide polymorphism is a potential risk factor that is associated with increased severity of chronic periodontitis.